



SpaceLand Lunar-Gravity flights

to prepare for

exploring and utilizing the Moon

The first SpaceLand missions

in synergy with **NASA NASA Space Shuttle L.F. &**

Kennedy Space Center Spaceport





SpaceLand



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- **European Headquarters, Mission Analysis and Basic Training:**
SpaceLand Campus c/o 2006 Olympic Park, Piemonte-Italy
- **Mission Training and Hardware Integration Labs:**
c/o NASA Center for Space Education - Kennedy Space Center - Florida
- **Zero-Gravity, Moon-Gravity and Mars-Gravity Mission Ops:**
Space Shuttle L.F. – NASA KSC (from 2008 in Europe & Asia, too)



SpaceLand 2005-2007 MAIN SPONSOR



2006 Public Outreach tour in Italy co-funded by the
Italian Ministry for Research, Universities and Education



Contributions also by:





About the speaker

Carlo Viberti:

- Graduated cum Laude at 24 yrs at Polytechnical Engineering Univ.of Torino - Italy
- First non U.S. taking off in zero-g from NASA Space Shuttle strip
- Former European Space Agency (ESA) Astronaut Office Engineer
- ESA Technical Manager for Zero-Gravity Flights and Underwater Tests for Internat. Space Station
- Former ESA Chairman of Technology Experiments on Russian Space Station MIR
- Prize award by the Italian Aeronautics and Aerospace Association
- Speaker at Seminar for the 2007 European-InterParliamentary Space Conference
- Certified by ESA for the Russian Space Suit underwater model
- More than 500 zero-g parabolas flown to date as SpaceLand Mission Commander





International records during microgravity research flights:

April 10, 2005: 1st Lunar / Martian / Zero-G non-gov. research flight
(entirely funded by *Regione Piemonte*)

- *world's oldest man flying in zero-gravity (86 years old)*
- *world's first woman with physical disabilities in zero-G*
(qualified the flight system for April 2007 flight of Prof. S. Hawking)

Nov 5, 2005: 1st non-gov. research flight from NASA Space Shuttle LF
(mission dedicated to the memory of *Prof. Angiolina Stura*)

August 6, 2006: 1st non-gov. Lunar/Martian/Zero-Gravity group flight
with scientists & laymen from NASA SSLF, incl. 1st Member of Parliament
(*Hon. Marco Airaghi*) (supported by *Regione Toscana and local governments*)

April 28, 2007: new record with a bioengineering test subject aged 93

upcoming: ***FULL MOON-GRAVITY R,D & T. FLIGHTS in 2008***
plus 1st sub-orbital research pathfinder test flight with 94 yr-old



Biomedical, Bioengineering, Pharmacodynamics state-of-the-art R & D



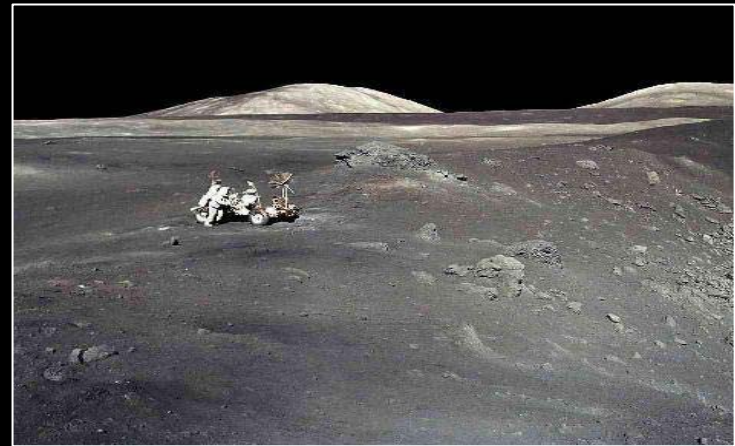
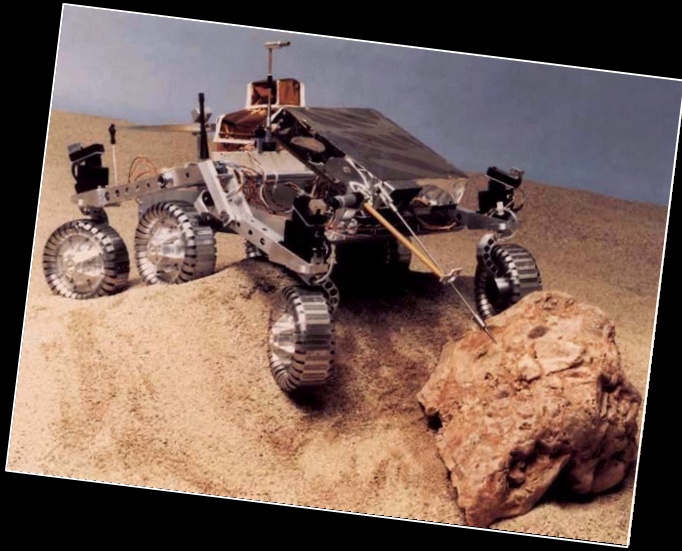


R., D. & T.

on *G-influenced* phenomena & pathologies

- *New macro-molecular bio-compounds, metal and hybrid-composite alloys, etc.*
- *Accelerated R, D & T on cytoskeleton, microbiological species, stem cells growth as well as on countermeasures w.r.t.::*
 - osteoporosis
 - muscular atrophy
 - cardiovascular pathologies
 - proprioceptive disturbances
 - neuro-vestibular disorders *etc.*
- *Research, Development and Test on other g-dependent events & phenomena made obscure by gravity:*
 - Life-Sciences & Biomedicine
 - Biotechnology & Bioengineering
 - hand-free ICT
 - Fluid Mechanics
 - Robotics
 - Material Sciences
 - Combustion Physics
 - Low Temperature Physics
 - Gravitational Physics
 - Etc.

Robotics & manned systems R., D. & T for Moon & Mars exploration programs



Manifested interest by **NASA, ESA, ASI** as well
as by contacts within **Canadian Space Agency,**
CNES, German Space Agency, ISRO

and others...



SpaceLand video by RAI TV

***6 educational episodes on Saturday evening prime time
within science program "Gaia"***



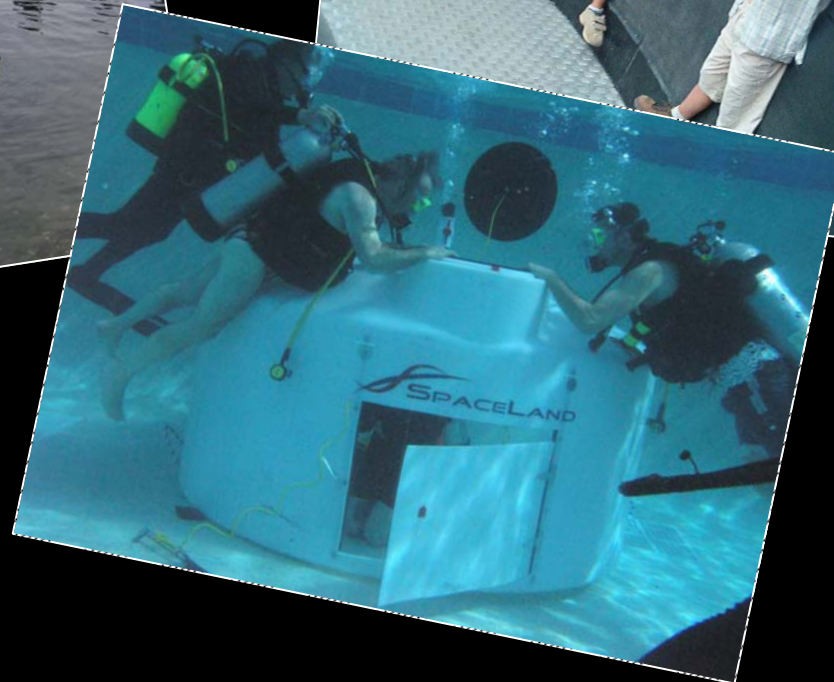


R. D. & T for elderly & disabled





Public Outreach, Training & Education



Micro-g R.,D.& T for elder people

Images from CNN TV, RAI TV and Mediaset





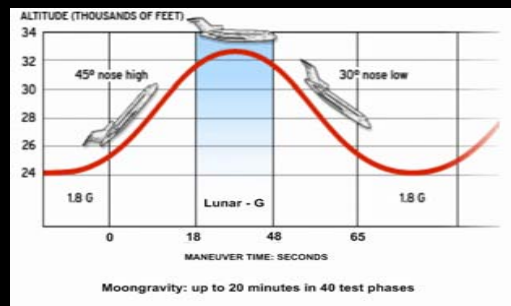
In Space there is gravity !



Orbital flights: zero-G due to constant centrifugation

SpaceLand sub-orbital: one centrifugation parabola

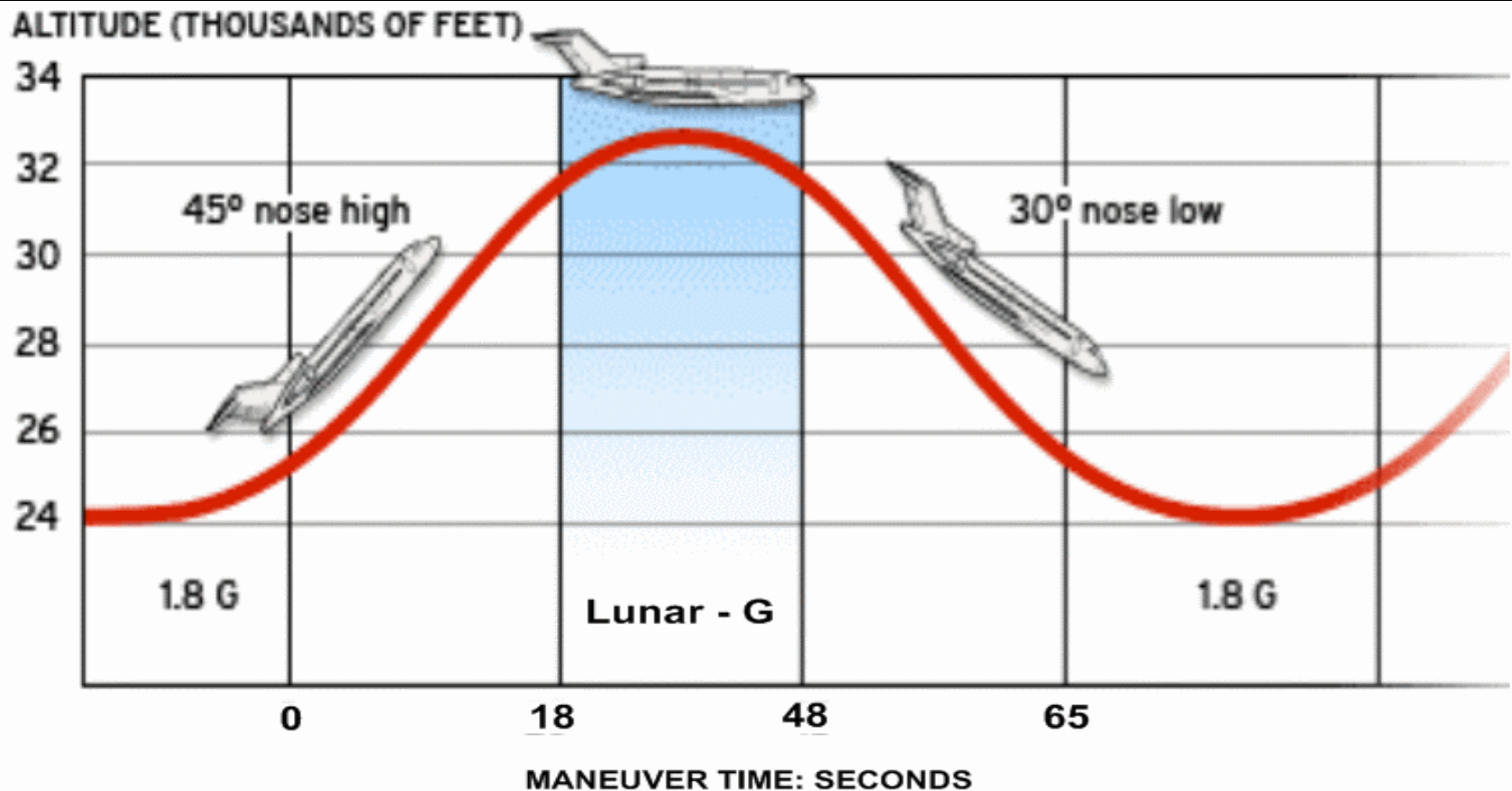
SpaceLand Lunar-gravity and Mars-gravity flights:
series of “trimmed parabolas” according to requirements



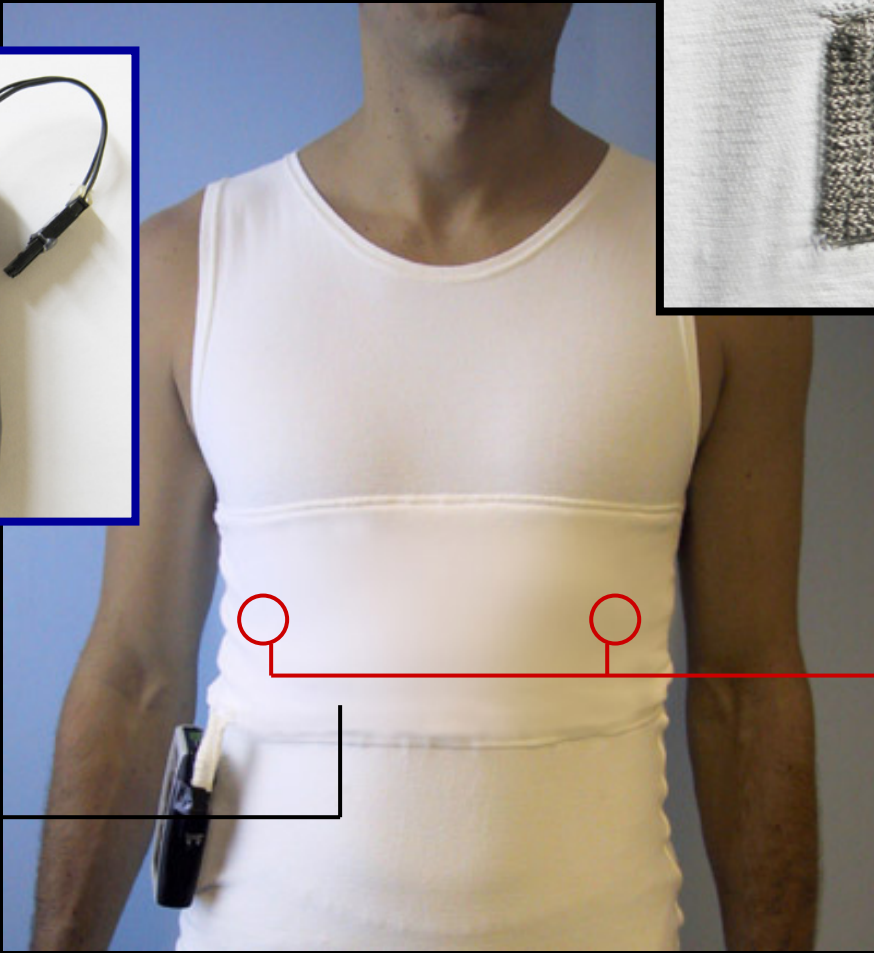
Back to our past: *in low-gravity...*

- Heart size reduces
- Blood V reduces by 15 % to 25 %
- Blood hydrostatic pressure reduces
 - > **Cardio-vascular deconditioning**
- Calcium absorption reduces
- Vitamine D formation reduces
- Osteoporosis accelerates
 - > **Bone loss by 1.6% per month**
 - > **Muscle-atrophy / loss by 1% per month**
- Thirst reduced / de-hydration increases
- Lymphocytes activity reduced
- Anti-biotic absorption reduced
- Drug effectiveness reduced - immune system drastically unpaired
 - > **Wounds and bone fractures heal slower**
 - > **Bacterial infection rises**

SpaceLand Moon-gravity atmospherical flights
0.16 g for half a minute, up to 40 times: 20 min of Lunar-gravity



Moongravity: up to 20 minutes in 40 test phases



ECG electrodes

Textile transducer for respiratory activity monitoring



April 28, 2007:

A new world record

3 minute video by CNN TV



Experimental Setup



MagiC system w/ local data storage and wireless transfer



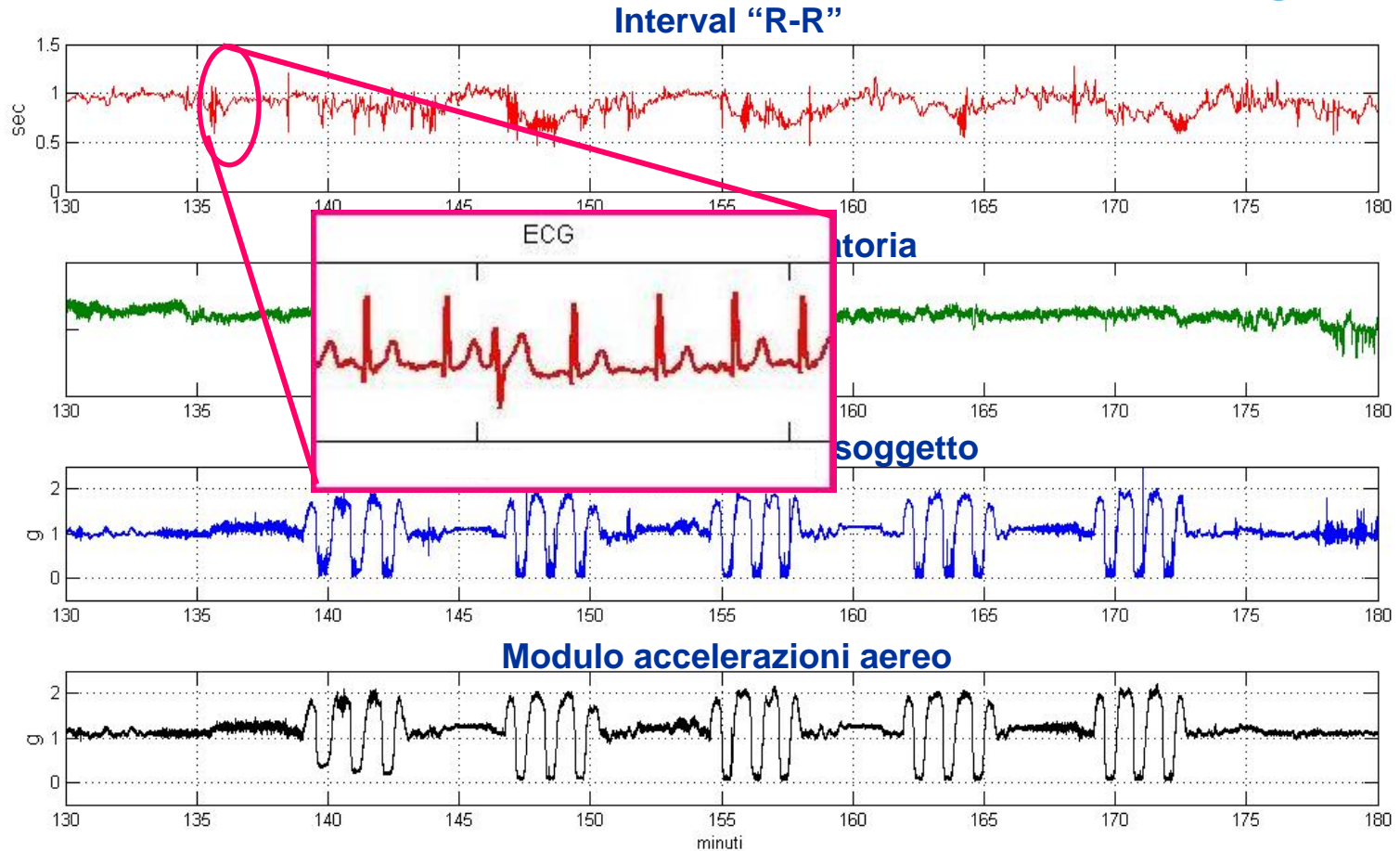
Data display palmtop



G-levels monitoring on airplane



93 yr-old SpaceLand Test Subject at the Kennedy Space Center



93-year-old SpaceLand test subject ECG during April 28 2007 Zero-Gravity, Lunar-G and Mars-G flight



Why SpaceLand

- In synergy w/NASA and Florida operational, educational, R & D facilities
- People from 12 years to 100 years of age can fly !
- Only 2 (two) months from agreement to research flight campaign
- Opened to everybody: scientists, industries, SMEs, individuals
- Lunar-gravity, martian-gravity & zero-gravity levels available *on request*
- Up to 30 (thirty) minutes of low / zero-gravity testing time per flight
- Up to 4 (four) flights per week
- Take off from the Space Shuttle Landing Facility at NASA KSC Florida
- Minimal ethical constraints & administration overheads
- No stringent medical exams required, no hypobaric chamber test required
- No competitive screening, no waiting lists: any safe experiment can fly
- System/ops training provided by experienced NASA & ESA veterans
- Astronaut-like training with Kennedy Space Center V.C. training facilities
- USA F.A.A. qualified aircraft, authorized by NASA
- Fully qualif. HW accommodation structures available on board for users
- Full insurance for user hardware and personnel on board (1M USD each)
- Flight suit, clothing and other complimentary items to each user flying
- Upcoming campaigns in Europe and possibly in Asia !



SpaceLand Research Flights - Mission specifications

Low & Zero Gravity phases (where G equals = 9.81 m/s^2) :

- Zero-G periods 20 s each, for a total of more than **13 minutes of Zero-G**
- Lunar-G periods (0.16 G), 30 s each, for a total of up to **20 minutes of Moon-G**
- Martian-G periods (0.32 G), 40 s each for a total of up to **26 minutes of Mars-G**

Hardware and personnel *fully insured* as on standard commercial airliner

Upcoming: sub-orbital weightless flights with up to 15 minutes of weightlessness

On board resources

- Seats for **35** passengers (scientists, managers, students, space-tourists)
- Six fixed video-cameras + availability of portable handy-cams
- Electrical power: 110 V - 60 Hz
- NASA & Federal Aviation Admin (FAA) *9-G-qualif.* accommodation racks
- Experiment room: approximately 15 m x 3.5 m x 2.2 m
- Pilots, coaches, flight surgeon, safety and operations engineers, cameraman
- ESA and zero-gravity flight veterans for integration, training, on board support
- Further resources available upon request

Ground segment:

- based at SpaceLand Camps in Italy and at NASA KSC Florida
- from 2008 optionally also in Europe



Next events:

- **Qualifier at SpaceLand Camp in French Riviera and Olympic Alps (Italy): 7-9 December 2007**
- **SpaceLand Mission Opportunities in 2008:**
 - **February** at NASA, Space Shuttle L.F. Florida
 - **August** in Europe
 - **November** in Europe

plus sub-orbital supersonic test flight at KSC



Within 2009:

World`s 1st children crew for Lunar-centrifuge test

jointly with the University of Udine (Italy)

- **Life-Science state-of-the-art added-values**
- **Unprecedented educational & communication opportunities**



SpaceLand

in synergy with NASA



THANK YOU for your time

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